

National Bureau of Standards

Certificate of Analysis

Standard Reference Material 195 Ferrosilicon (75% Si - "High-Purity" Grade)

(In cooperation with the American Society for Testing and Materials)

This SRM* is in the form of fine powder and is intended for use both in checking chemical methods of analysis and in calibration with instrumental methods of analysis.

Constituent	Si	Fe	C	Mn	P	S	Cu	Ni	Cr	B	Zr	Ti	Al	Ca	Co
Certified Value, % by wt. ¹	75.3	23.6	0.034	0.17	0.017	0.001	0.047	0.032	0.047	0.0010	0.011	0.037	0.046	0.053	<0.01
Estimated Uncertainty ²	0.1	0.1	0.001	0.01	0.001	---	0.002	0.001	0.003	0.0001	0.003	0.002	0.004	0.003	---
Method		SnCl ₂ -K ₂ Cr ₂ O ₇	Chromatographic	Photometric	Photometric	Combustion- Titration	Photometric				Photometric	Photometric	Photometric		
Lab															
1	^a 75.26 ^b 75.19	23.57	---	^c 0.17	---	---	^d 0.045	^d 0.032	^e 0.046	^d 0.0010	---	---	---	---	---
2	^a 75.35	23.74	^f 0.035	.17	0.018	---	^g .048	^h .032	^e .050	ⁱ .0012	^j 0.010	^k 0.038	^h 0.045	^h 0.052	---
3	^l 75.34	23.75	.034	.17	.018	0.001	^m .048	ⁿ .030	^o .045	^p .0010	^q .009	^k .035	^r .050	^s .058	ⁱ <0.01
4	75.40	23.66	.034	^h .17	.016	^t .001	^h .046	^h .033	^h .049	^u .0010	.014	^k .037	^h .043	^h .050	^h <.01
5	^l 75.21	23.56	.035	---	---	.001	---	---	---	---	---	---	---	---	---
6	^v 75.30	23.50	---	---	---	---	---	---	---	---	---	---	---	---	---

¹The certified value listed for a constituent is the present best estimate of the "true" value based on the results of the cooperative program for certification.

²The estimated uncertainty listed for a constituent is based on judgment and represents an evaluation of the combined effects of method imprecision, possible systematic errors among methods, and material variability for samples 0.5 g or more. (No attempt was made to derive exact statistical measures of imprecision because several methods were involved in the determination of most constituents.)

^a0.5 g sample fused with Na₂O₂, dehydration with HCl.

^b0.5 g sample fused with Na₂CO₃+KNO₃, dehydration with HCl. Soluble silica determined photometrically.

^cPeroxydisulfate-arsenite titration.

^dIsotope dilution, mass spectrometry.

^ePeroxydisulfate oxidation, titration with ferrous ammonium sulfate.

^fCombustion-conductometric.

^gNeocuproine photometric.

^hAtomic absorption spectrometry.

ⁱEmission spectrometry.

^jIon-exchange, phenylfluorone photometric.

^kH₂O₂ photometric.

^lDehydration with HC10₄.

^mDiethyldithiocarbamate photometric.

ⁿKCN-AgNO₃ titration.

^oDiphenylcarbazide photometric.

^pAzure C photometric.

^qX-ray spectrometry.

^rCDTA titration.

^sEDTA titration.

^tCombustion, pararosaniline photometric.

^uCurcumin complex photometric.

^v0.5 g sample fused with Na₂CO₃+Na₂O₂, dehydration with HCl. Second dehydration with HC10₄.

*A companion material, SRM 58a, Ferrosilicon (73% Si - Regular Grade) also is available.

Washington, D.C. 20234

April 25, 1978

(Revision of Certificate 1/7/76)

J. Paul Cali, Chief
 Office of Standard Reference Materials

(over)

PLANNING, PREPARATION, TESTING, ANALYSIS: Based on documented needs, two SRM's for the 75% ferrosilicon grade were planned; this new SRM 195, High-Purity Grade, and the renewal SRM 58a, Regular Grade.

The material for this Standard was supplied in pulverized form (<0.15 mm) by the Union Carbide Corporation, Ferroalloys Division.

Following sieving and blending operations at NBS, homogeneity testing was performed by S. D. Rasberry, J. McKay and D. Reid (x-ray fluorescence analyses); and by K. M. Sappenfield (chemical analyses). Selected samples representative of the lot were analyzed and no significant material variability was observed when using samples of 0.5 g or larger.

Cooperative analyses for certification were performed in the analytical laboratories of Allegheny Ludlum Steel Corporation, Research Center, Brackenridge, Pennsylvania, R. B. Frictioni and M. A. McMahon; Armco Steel Corporation, Research Center, Middletown, Ohio, M. Dannis, E. C. Schmidt, and R. J. Bendure; Carpenter Technology Corporation, Reading, Pennsylvania, A. L. Sloan; Interlake, Inc., Globe Metallurgical Division, Beverly, Ohio, J. C. Cline and R. A. Pontello; Union Carbide Corporation, Ferroalloys Division, Marietta, Ohio, H. H. Hall, J. J. Armour, and G. Porter.

Analyses were performed in the NBS Analytical Chemistry Division by K. M. Sappenfield, E. L. Garner, and R. K. Bell.

Final certification was under the auspices of the ASTM-NBS Research Associate Program.

In the course of chemical characterization in the Industry-ASTM-NBS cooperative program, additional information on some constituents was provided. Although *not certified*, information on the constituents is given below.

<u>Element</u>	<u>Percent by Weight</u> <u>Not Certified</u>
Oxygen	(0.42)
Molybdenum	(.01)
Arsenic	(.0024)
Vanadium	(.001)
Tin	(<.005)
[Total by difference	(99.9)]

The overall direction and coordination of the technical measurements at NBS leading to certification were performed under the direction of O. Menis and J. I. Shultz.

The technical and support aspects involved in the preparation, certification and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R. E. Michaelis.

NOTE: A selected portion of this ferrosilicon material was sent to the Bundesanstalt Für Materialprüfung, Berlin, Germany, to aid standardization in Germany and to promote international standardization.